Actisense™

NMEA Data Combiner

NDC-3-B-USB

User Manual

Issue 1.31

- Multiple talker interface for use with the NMEA 0183 standard. Serial-data networking of marine electronic devices / instruments
- Personal computer (both RS232 and USB 1.1) interfaces to the NMEA 0183 standard

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Important Notices

The **Actisense™** NMEA Data Combiner (NDC-3) is intended for use in a marine environment, primarily for below deck use. If the unit is to be used in a more severe environment, such use may be considered misuse under the seller's warranty.

The **Actisense™** NMEA Data Combiner (NDC-3) has been certified to comply with the European directive for Electro-Magnetic Compatibility (EN60945), and is appropriately CE marked. Operation of the unit should be in conjunction with appropriate CE approved shielded connectors and cabling used in accordance with the CE directive EN60945. Any EMC related issues should be reported to Active Research immediately to allow the company to rectify or resolve EMC related problems in accordance with its obligations under EN60945.

If the unit is connected such that compliance failure occurs beyond the company's control, the company shall not be held responsible for compliance failure until suitable EMC guidelines for connection are seen to have been taken.

Notices

When using this document, keep the following in mind:

The products described in this manual and the specifications thereof may be changed without prior notice. To obtain up-to-date information and/or specifications, contact Active Research Limited or visit the **Actisense™ website (www.actisense.com)**.

Active Research Limited will not be liable for infringement of copyright, industrial property right, or other rights of a third party caused by the use of information or drawings described in this manual.

All rights are reserved: The contents of this manual may not be transferred or copied without the expressed written permission of Active Research Limited.

Active Research Limited will not be held responsible for any damage to the user that may result from accidents or any other reasons during operation of the user's unit according to this document.

The NDC-3 does not validate the NMEA data it receives in any way. Neither the NMEA sentence checksum, nor the data contained within the NMEA sentence is validated. Therefore, the electronic device(s) supplying the NDC-3 with NMEA data retain(s) the sole responsibility for the NMEA data's validity.

Foreword

Actisense™ recognises that instructions are often skipped, so we have aimed to write this document in an informative, yet direct manner that will aid the user. We have tried to cover all the points a typical user may need to know. Please read all sections before installing and using the **Actisense™** NMEA Data Combiner product and any related software programs.

Introduction

The **Actisense™** NMEA Data Combiner (NDC-3) product developed out of the requirement to solve two fundamental problems with the existing marine industry NMEA 0183 communications standard.

In theory, the NMEA 0183 standard allows any suitably designed marine electronic device to share its gathered information with any other device on a vessel. Unfortunately, there is one very large drawback with this standard - only one device on a connected network can actually send data (a single talker), with multiple devices (determined by the current limit of the sending unit) listening to that data (multiple listeners).

If the vessel owner has an instrument that ideally requires the data output of two or more devices, for example a chart plotter, then the owner has no alternative but to settle on connecting only the most important device (that which supplies the most used information), normally that is the GPS unit. All other devices cannot be used.

What happens if the owner prefers the vessels gyro compass heading output to that of the GPS, or requires that the current depth be displayed on the plotted chart to help avoid the possible case of running the vessel aground on a shifting sand bank? The NMEA 0183 standard cannot supply an answer to those questions as it can handle only one transmitting device.

These two elementary problems can be solved simply and easily with the **Actisense™** NMEA Data Combiner's very flexible design approach.

Alternately, if the vessel has two or more identical NMEA devices (e.g. GPS's or depth sounders) the system solution could be to use the **Actisense™** NMEA Autoswitch.

Full information on the complete **Actisense™** product range can be found on the **Actisense™ website**.

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General features

4 NMEA 0183 data input ports

Each NMEA 0183 input port has a priority level. This is fixed to the logical order that matches the port numbers, i.e. port 1 has the highest priority and port 4 has the lowest.

An NMEA 0183 data combined output port

This output combines the input data into one standard NMEA output. The NMEA inputs and output have the same baud rate. This means that the output can only carry as much data as one of the inputs - therefore the combined data from all four NMEA input channels could exceed the data carrying capacity of the NMEA output channel. The combiner contains special software to ensure that when the output channel is overloaded, new data of the same type as older data, still in the buffer, will overwrite the older sentence. This will only happen when the output load becomes too high, and ensures that the combiner cannot build up excess old data in the case where the output stream is fully loaded or overloaded.

A PC RS232 or USB bi-directional port

A PC can use the RS232 or USB port to read all the NMEA data traversing through the NDC. This allows for the possibility of a “virtual cockpit” of instruments displaying all available data in any manner the user requires (available from a number of manufacturers).

Technical features

High-speed micro-controller capable of 10 million instructions per second.

Flash ROM technology that supports automatic programming for quick and easy updates, 10,000+ erase cycles and a 10-year Data Retention provides carefree user configuration.

On-chip memory store allows buffering of short term NMEA data, allowing the unit to smooth short-term peaks in the NMEA data flow.

NMEA 0183 inputs are opto-isolated differential inputs to fully comply with the NMEA 0183 standard specification. This allows the inputs to work correctly with long cable runs and in a noisy environment. Typical operating voltage is 2.0v to 15.0v. The unit can withstand +/- 35v continuously, and +/- 40v transients. The Opto-isolator can protect any upstream equipment (chart plotter, laptop PC, radar etc.) from up to 2000v of common mode voltage difference.

NMEA 0183 full-differential output driver. This can drive up to 15 fully compliant NMEA 0183 device loads, with a 30mA (maximum) drive capability. The full-differential output ensures better quality communications and lower noise emissions on unshielded twisted pair cabling.

Full specification RS232 or USB interfaces ensures that any marine electronic device (or PC) that has an RS232 or USB port receives all the input NMEA data, and can add its own NMEA data to the combined output. This connection also allows the unit to be updated via the free flash upgrade software that will be made available on the **Actisense™** website if the NDC-3 software has been enhanced.

Wide battery input voltage range to offer maximum compatibility, the NMEA 0183 NDC-3 can operate from a battery supply anywhere between 8 and 35 volts.

Low Power Consumption that is typically 26-30mA at 12 volts and 16-18mA at 24 volts.

A diagnostic LED indicates the operation mode of the NDC-3, if any faults have been detected, or the peak load currently on any one of the NMEA inputs.

Very tough Polycarbonate case is certified to IP66 (classified as “totally protected against dust and protection against low pressure jets of water from all directions”). Being Polycarbonate, it is also incredibly strong, offering a wide temperature range and superior protection to the electronics inside. The IP66 rating of the case is only limited by the sealing gasket strip, which can be enhanced by applying a suitable non-acid based marine sealant to the gasket after wiring and testing. This will allow use of the unit in areas where salt spray could enter, accidental immersion may occur, or in environments where maximum long-term reliability is paramount.

Robust Nylon grommets are certified to IP68 (classified as immersible for long periods without water ingress). Note that to achieve this level of water integrity all grommets must be occupied by round-section cables.

Large range of possible cable diameters of between 4.5 mm and 10 mm, single or multi-pair wire types can be easily accepted.

Software updates

The NDC-3’s built-in firmware is held in “flash” memory, allowing quick and easy upgrades using a simple Microsoft Windows (95/98/ME/NT/2000/XP) user interface program (Flash Centre) running on a connected PC.

It is our policy to provide these updates free on our website, **www.actisense.com**, so that your combiner can become more sophisticated with time, and should there be any bugs reported in the software, they can be promptly fixed without the unit coming out of commission. This upgrade can be performed with the unit completely in-situ, via a PC connected to the RS232 or USB port.

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Connecting devices together

The basics

NMEA data is transmitted from an information source such as GPS, depth sounder, gyro compass etc. These data sending devices are called "**Talkers**".

Equipment receiving this information such as a chart-plotter, radar or NMEA display is called a "**Listener**".

Unfortunately, only one Talker can be connected on to a single NMEA 0183 system at any one time. Two or more Talkers are simply not possible because they are not synchronised to each other, and will attempt to 'talk' at the same time (over each other), resulting in corruption of the NMEA data, and potentially in disaster if valuable data such as navigation information is lost or corrupted so that it is incorrect and/or misleading.

Actisense™ produces a full range of products to solve all NMEA interfacing requirements.

Please visit the **Actisense™ website** for full details on these and other **Actisense™** interfacing, Depth sounding and Sonar products.

The NMEA signals

The NMEA 0183 system v2.0 and later uses a "differential" signalling scheme, whereby two wires are used to transmit the NMEA data. These connections will be labelled as either NMEA "**A**" and "**B**" or NMEA "**+**" and "**-**" respectively, depending on the instrument and manufacturer.

When connecting between different manufacturers, there can be some confusion, but it is simple and easy to remember: NMEA "**A**" connects to NMEA "**+**" and NMEA "**B**" connects to NMEA "**-**".

The different NMEA standards

The NMEA 0183 specification has slowly evolved over the years, so connecting one device to another is not always a straightforward matter. The earlier versions of NMEA 0183 (before v2.0, as detailed above), used slightly different connection methods and signal levels: the instruments had just one "NMEA" data line ('**Tx**' or '**Out**'), and used the ground as the other line - similar to the way a computer serial port works. This connection method is referred to as "single ended" instead of the "differential" method used by NMEA 0183 v2.0 devices.

The data format is largely the same between both systems, with v2.0 adding some extra sentence strings, and removing older (redundant) sentence strings from the specification. The situation is further complicated, as many manufacturers still use the old ("single ended") method of connection because it is cheaper to implement.

So how can an older type NMEA device be connected to a newer type device?

Care is needed – it is possible to damage or overload the output of a newer differential device if it is incorrectly connected to an older device. This is because the older devices used ground as the return, whereas the newer devices actually drive the NMEA "**-/B**" line between 5v and 0v. Thus, connecting this output to ground will result in high currents being drawn by the driver instrument, resulting in potential overheating and damage to the driver circuits.

To connect a new type differential device to an old type single-ended system, connect the NMEA "**+/A**" output from the differential driver to the single-ended NMEA "**Rx**" or "**In**" input of the device. Leave the NMEA "**-/B**" output floating. Connect the ground line of the differential output device to the ground of the single-ended device. This provides the required data signal return current path.

To connect an old type single-ended device to a new type differential device, connect the NMEA "**Tx**" or "**Out**" output from the single-ended driver to the differential NMEA "**+/A**" input of the device. Connect the ground line of the single-ended output device to the NMEA "**-/B**" input of the differential device. This provides the data signal return current path. If the NMEA "**-/B**" input is left floating, then data corruption / errors may occur.

Please refer to the **Output Connections** section for example of these connection methods.

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Connections

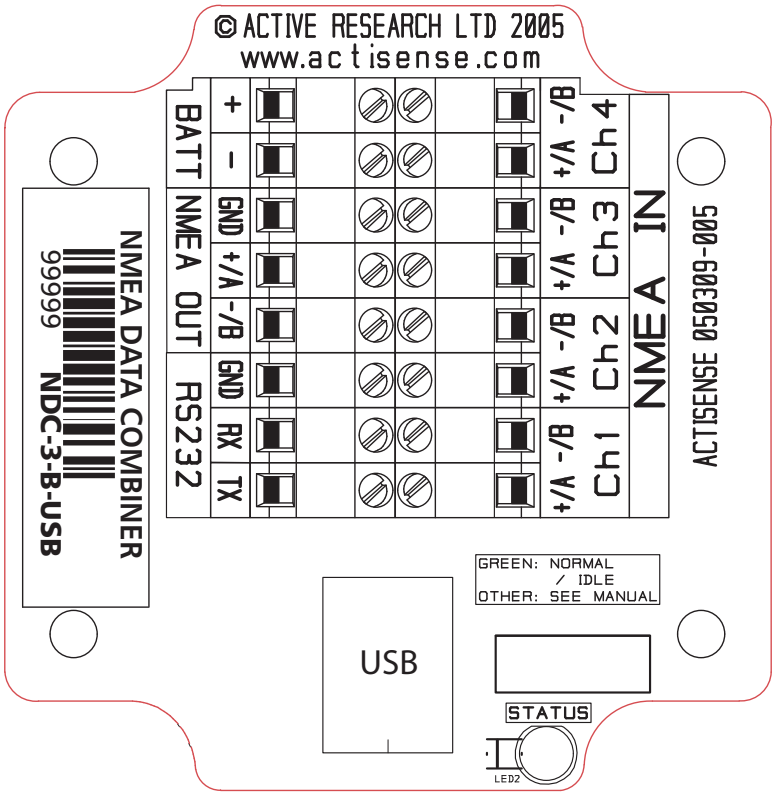

Figure 1 – All external connections

The NMEA Data Combiner (NDC-3) has screw-terminal “Phoenix” type external connections for: -

1. Four NMEA 0183 inputs.
   All NMEA 0183 inputs are of the differential opto-isolated type and use the unique **Actisense™** low current drain circuitry (2mA @ 2.0v) to conform in full with the NMEA 0183 marine electronic device network communication standard, and are flexible enough to interface to most fully and partially compliant devices.

2. An NMEA (data combined) 0183 output.
   The NMEA 0183 output comprises of three connections: ‘**+**’, ‘**-**‘ and ‘**Ground**’ and conforms in full to the NMEA 0183 standard. This allows the NDC to interface to various different devices that require any combination of these outputs.

3. An RS232 input/output.
   The bi-directional RS232 port is designed for direct connection to a Personal Computer (PC) or other marine device capable of interfacing to a standard RS232 port. When a USB cable is plugged into the NDC-3, the RS232 port switches to output only - i.e. the RS232 input no longer operates.

4. A USB input/output.
   The standard USB 1.1 port is designed for direct connection to a PC’s USB port. Once the USB cable is plugged into the NDC-3, the RS232 port switches to an output only mode - this allows the USB port to take over bi-directional control of the NDC-3.

   USB 2.0 is backwardly compatible with USB 1.1.

5. Battery supply input.
   Standard battery power connections.

Note:

1. To complete the NMEA 0183 standard all device interconnection NMEA cables used should meet the two-conductor, shielded, twisted pair configuration specification. The shield connection of these wires should be connected at the instrument end only to prevent ground loops.

2. Refer to the **Specifications** section for the full details on input/output specifications.

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Connecting to NMEA devices

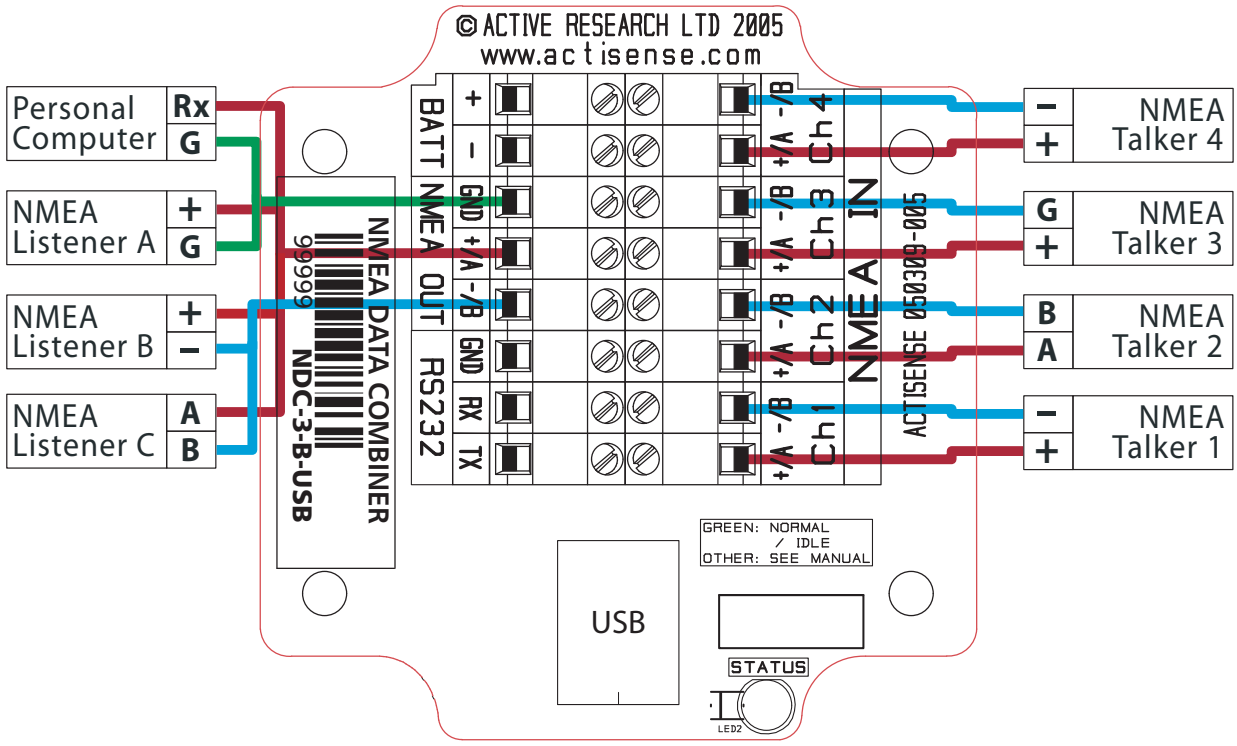

Figure 2 – NMEA 0183 connections

NMEA 0183 Inputs

The NMEA 0183 differential opto-isolated inputs are designed to handle a variety of NMEA 0183 device output specifications. Please determine (from device manufacturer's information) if the device(s) required to be connected to the **Actisense™** NDC-3 conforms in full to the NMEA 0183 network communication standard. If it does not, the flexible **Actisense™** NDC-3 inputs should still be capable of interfacing with the device, though this is not guaranteed.

The diagram above shows a typical installation with both fully compliant NMEA devices with differential inputs/ outputs, and non-differential output devices that output NMEA using the ground line as the "**NMEA -**" line.

NMEA Talker devices 1, 2 and 4: These devices conform in full to the NMEA 0183 standard. Devices 1 and 4 share the same connection ID's as the **Actisense™** NDC, so connection is a simple matter of matching the ID's (refer to figure 2). Device 2 uses the RS485 convention connection ID's. Simply connect '**A**' to '**+/A**' and '**B**' to ' **-/B**' (refer to figure 2).

NMEA Talker device 3: This device does not conform completely to the NMEA 0183 standard. However, by connecting '**+**' to '**+/A**' and its '**G/Ground**' to the NDC "**-/B"** the NDC should be able to receive the NMEA data correctly.

NMEA 0183 Output

The NMEA 0183 buffered output is capable of driving up to 15 NMEA 0183 fully compliant listening devices, or a mixture of NMEA 0183 devices and a Personal Computer (PC) communication port.

NMEA Listener device's B and C: These devices conform in full to the NMEA 0183 standard and their connection ID's match that of the NDC.

Personal Computer: Whilst the RS-232 port is designed for connection to a PC, the NMEA 0183 output is also capable of being read by most PC's. Simply connect '**+**' to '**Rx**' and '**G**' to **'Gnd**' on a standard D-type (probably male) connector.

NMEA Listener device A: This device does not conform in full to the NMEA 0183 standard. However, by connecting '**-**' to '**-/B**' and '**G/Ground**' to '**Gnd**' the device should be able to receive the NMEA data correctly, though this is not guaranteed.

Note:

1. Wire colours are for guidance only.

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Other Connections

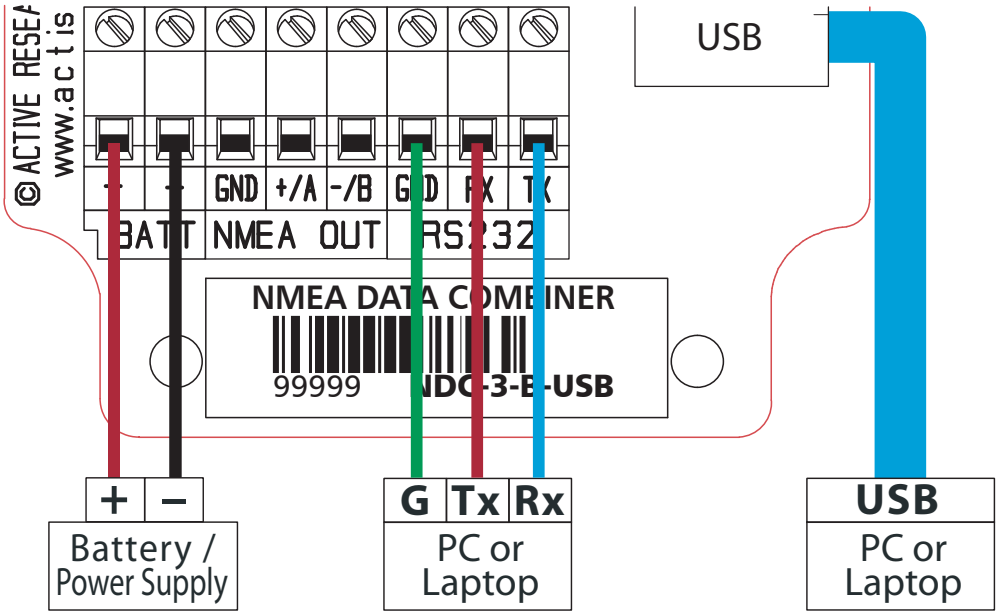

Figure 3 – RS232, USB and Battery connections

Connecting to a Personal Computer

The USB port can be used to connect a PC to the NMEA 0183 system. The USB port has priority over the RS232 port - when a USB cable is plugged into the NDC-3, the RS232 port will switch to an output only mode, to allow the USB port to have bi-directional control of the NDC-3.

The NDC-3 should be used with the 2 metre USB cable supplied as standard. If a longer cable length is required, a standard USB 1.1/2.0 extension cable should be used in conjunction with the existing USB cable. This extension cable would have **female** '**A**' and **male** '**A**' connectors.

Alternatively, the RS232 port can be used to connect a PC into the NMEA 0183 system by using a serial port cable conforming to the following specification:

1. A D-type female (socket) connector for the PC end of the cable

2. A minimum of 3 cores are required in a shielded cable. Higher quality cable will yield higher performance (SNR). Most typical cables have two twisted pairs inside. In this case, use one pair for the **TX** line and one for the **RX** line. Use the spare wire in each pair as ground, and connect the cable shield to ground only at the computer end.

3. The **TX** of the NDC-3 should be connected to the **RX** of the computer (standard D-type, pin 2) and the NDC-3 **RX** should be connected to the **TX** of the computer (pin 3). The **GND** of the NDC-3 should be connected to the PC's serial port ground (pin 5).

Connecting to the battery supply

The **Actisense™** NDC-3 should be wired to the vessel's battery supply in the most direct manner possible, to minimize interference from other electronic devices. The cable used should be of sufficient gauge to handle the power requirements of the **Actisense™** NDC-3 (refer to the **Specifications** sections).

Note:

1. Wire colours are for guidance only.

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Troubleshooting guide

This guide will concentrate on all relevant troubleshooting issues above simple cable connection faults. Therefore, the cables between the NDC-3 hardware and any other devices should be checked as a matter of course, before continuing with this guide.

Diagnostic LED

The NDC-3 hardware supports a tri-colour diagnostic LED that indicates the current operating mode of the hardware, or if an error has been detected during the self-test initiation process. Table 1 details what each LED colour represents and if any user interaction is required.

LED Colour / Flash Count	Mode / Error condition	Required user response
	Normal operation modes	The sequence below indicates a successful power-up of the NDC-3 and the commencement of data combining.
Red, No flashing	Start-up mode, No error	No response required. A normal operation mode that should last for no more than 1.5 seconds. Any longer indicates an error with the main program.
Red, No flashing	Flash updating mode, No error	No response required. LED will stay red for the duration of the flash update operation (using Flash Centre). Once operation complete, NDC hardware will be automatically reset.
Amber, No flashing	Initialise and self-test mode, No error	No response required. A normal operation mode that follows after the Start-up mode and should last for approximately 1 second.
Green, No flashing	Normal and no data mode, No error	No response required. A normal operation mode that follows the Initialise and self-test mode. Indicates that no error was detected during the self-test operation. Also indicates that no data is currently being received by the NDC-3 hardware.
Green, Flashing (1-10 per second)	Normal and data Rx mode, No error	No response required. A normal operation mode that indicates that data is currently being received (on at least one channel) by the NDC-3 hardware. Flash rate proportional to Rx rate.
	Error conditions	If the error persists the NDC-3 unit should be returned to **Actisense™** (refer to the **Contact Information** section).
Amber, Flashing (Once every 4 seconds)	Error trap mode, EEPROM memory error	An error with the EEPROM memory has been detected during the self-test mode. Reset the NDC-3 hardware.

Table 1 – Diagnostic LED colours

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USB Driver Installation

The **Actisense™** NDC-3 makes use of a virtual serial port driver (know as the Virtual COM Port Driver) to interface between the USB port on the PC and the **Actisense™** product. This driver allows software running on a PC to communicate with the **Actisense™** NDC-3 as if it was connected to a standard serial port on the PC, when in fact all communication is done over the USB connection.

The required driver installation comes in two seperate packages. The first driver is a called the 'Serial Converter' which converts the USB data packets to a serial data stream. The second driver, called the 'Actisense NDC USB Serial Port', makes the USB connection appear as a COM port in the Windows™ Device Manager.

The NDC-3 with USB connection has been extensively tested with both Windows™ XP and Windows™ 98 SE.

For the experienced Windows™ XP user who is used to installing drivers, this section will be very familiar. To all other Windows™ users, the required steps are detailed below to help with installation.

The steps for Windows™ 98 SE are very similar to those of Windows™ XP and so are not detailed here.

The **Actisense™** CD also contains the USB drivers for Windows™ 2000. These drivers have not been tested by **Actisense™**, but should operate in the same manner as the Windows™ 98 SE and XP drivers.

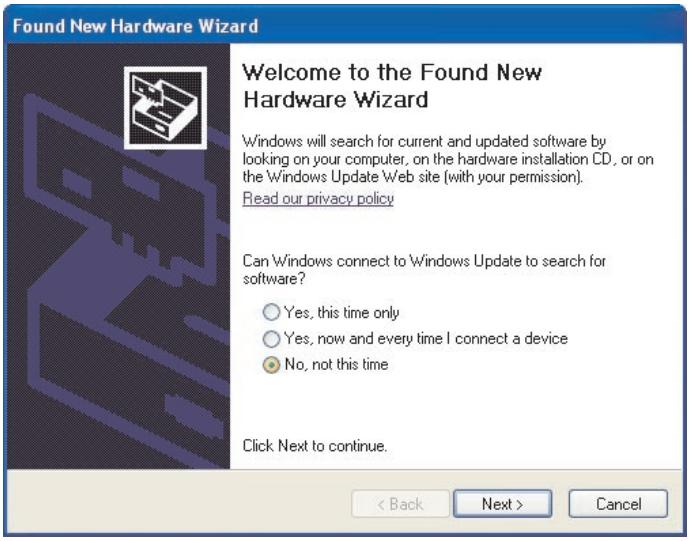
The required Linux drivers are already included in the Linux kernels from v2.4.20 and onwards. However, **Actisense™** has not been able to test the compatibility of the NDC-3 with USB and this driver.

For MAC OS 8, 9, and X please contact **Actisense™** for details (refer to the **Contact Information** section).

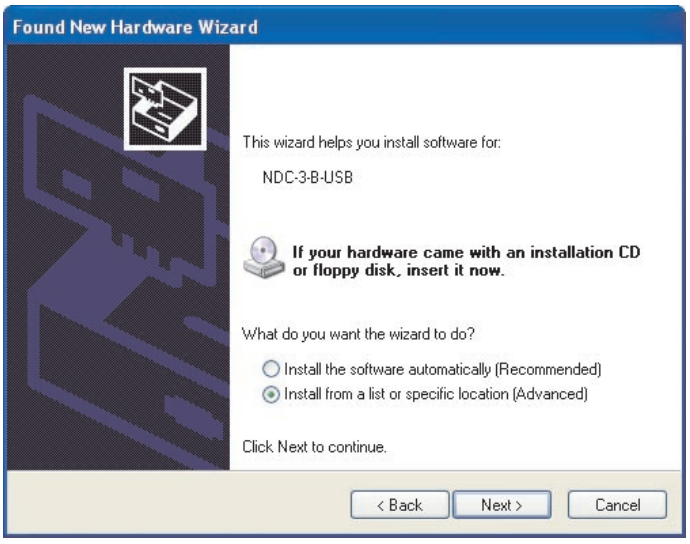
Step by step guide

1. Make sure the **Actisense™** NDC-3 is powered up (indicated by a green LED) and connected to an available USB port on the PC. The standard Windows™ 'Found New Hardware Wizard' window will then appear.

Select the '**No, not this time**' option, to allow driver installation from the **Actisense™** CD which was supplied with your Actisense product.


Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).
Read our privacy policy
Can Windows connect to Windows Update to search for software?
Yes, this time only
Yes, now and every time I connect a device
No, not this time
Click Next to continue.
< Back
Next >
Cancel

2. Insert the **Actisense™** CD, choose the '**Install from a list or specific location**' option, and click '**Next**'.


Found New Hardware Wizard
This wizard helps you install software for:
NDC-3-B-USB
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

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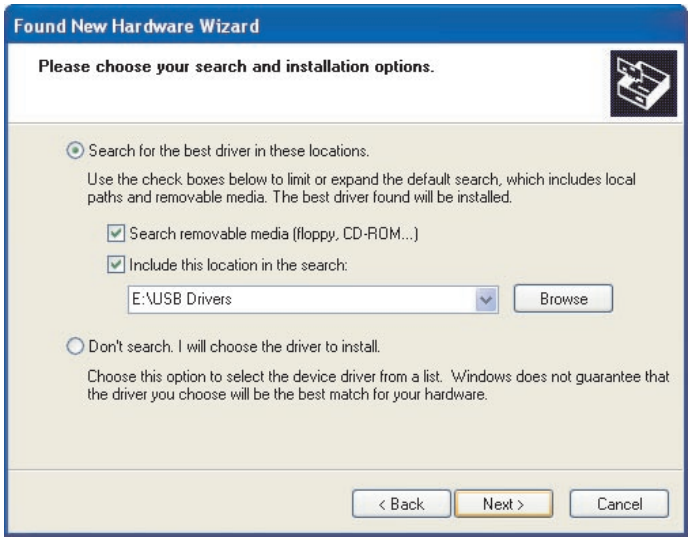
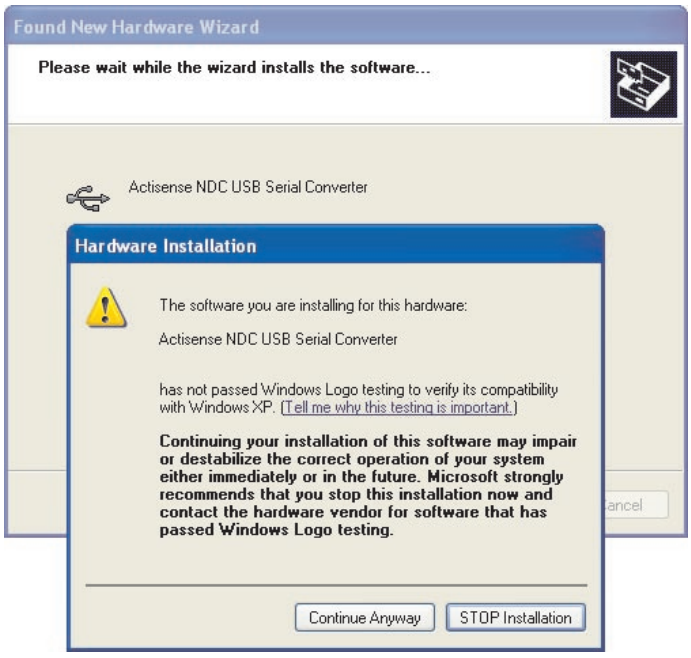
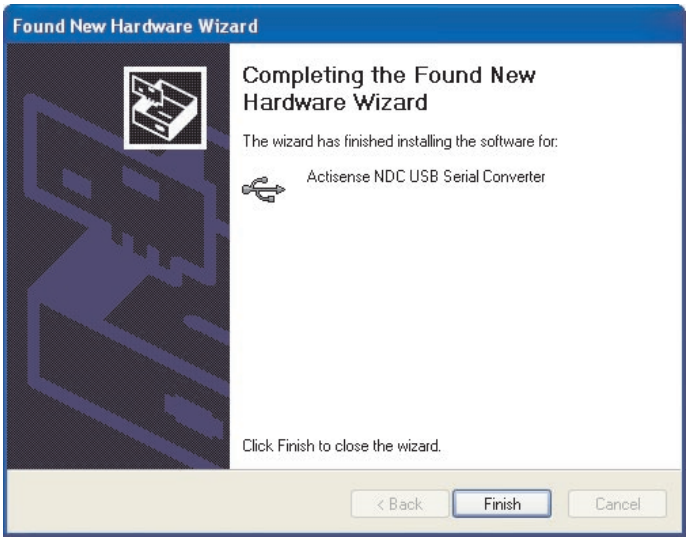
4. Make sure the '**Include this location in the search**' option is ticked, and use the '**Browse**' button to locate the '**USB Drivers**' directory on the **Actisense™** CD.


Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM...)
Include this location in the search:
E:\USB Drivers
Browse
Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back
Next >
Cancel

5. The '**Actisense NDC USB Serial Converter**' driver is not Microsoft Windows™ certified, but it has been 'tried and tested' for stable and reliable operation with the **Actisense™** NDC-3. Click '**Continue Anyway**' to carry on with the installation.


Found New Hardware Wizard
Please wait while the wizard installs the software...
Actisense NDC USB Serial Converter
Hardware Installation
The software you are installing for this hardware:
Actisense NDC USB Serial Converter
has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.)
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.
Continue Anyway
STOP Installation

6. The '**USB Serial Converter'** driver is now installed, click '**Finish**' to complete the wizard, and wait for the '**Found New Hardware Wizard**' to appear again.


Found New Hardware Wizard
Completing the Found New Hardware Wizard
The wizard has finished installing the software for:
Actisense NDC USB Serial Converter
Click Finish to close the wizard.
< Back
Finish
Cancel

This second wizard will guide you through the '**USB Serial Port**' driver installation.

7. Follow steps **1** to **5** above for the '**USB Serial Port**' driver installation and click '**Finish**' to complete.

'**Your new hardware is installed and ready to use**' will appear in the bottom right corner of your screen when the installation is complete. See the USB Driver Configuration section for details on how to find out which COM port number has been allocated to your **Actisense™** device as well as how to change to a different COM port and configure the Baud rate.

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USB Configuration

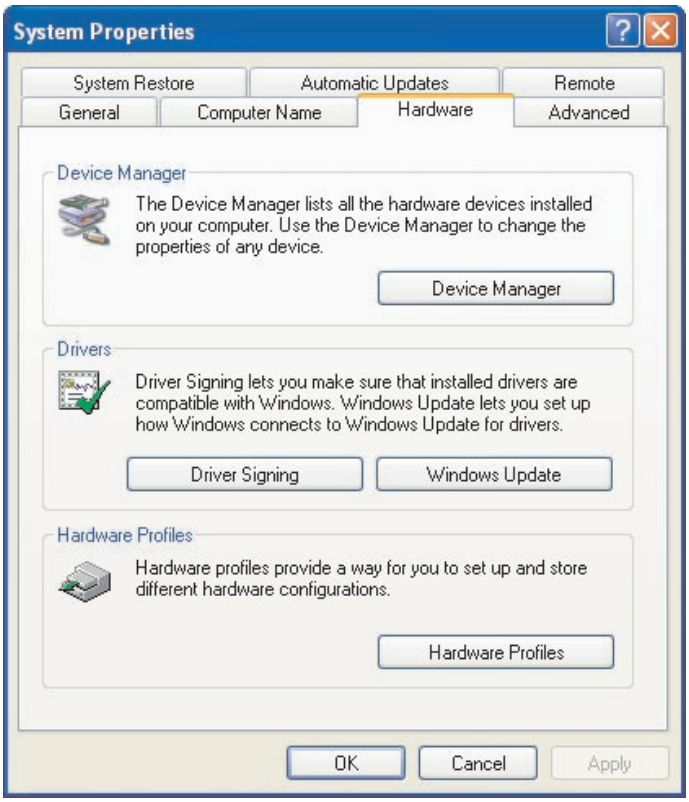
To communicate with the NDC-3, the COM port number that Windows™ has allocated to the USB port needs to be determined. The following guide will walk the user through this standard operation.

The **Actisense™** NMEA Data Combiner, NDC-3 is completely USB port independent: it can be easily unplugged from one USB port and connected to another available USB port on the same PC without the COM Port number changing.

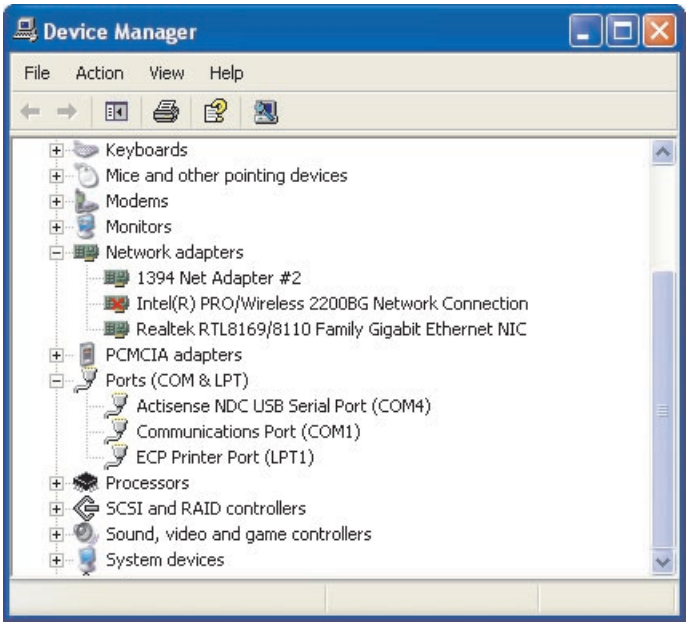
This is very useful when the NDC-3 is working in unison with a software program that is set up to use a particular COM port, as the user does not need to reselect a different COM port everytime the PC reboots, or the cable is swapped between two USB ports.

Step by step guide

1. Make sure the **Actisense™** NDC-3 is powered up (indicated by a green LED) and connected to an available USB port on the PC. From the Windows™ '**Control Panel**', open the '**System Properties**' window and click on the '**Hardware**' tab.


System Properties
System Restore
Automatic Updates
Remote
General
Computer Name
Hardware
Advanced
Device Manager
The Device Manager lists all the hardware devices installed on your computer. Use the Device Manager to change the properties of any device.
Device Manager
Drivers
Driver Signing lets you make sure that installed drivers are compatible with Windows. Windows Update lets you set up how Windows connects to Windows Update for drivers.
Driver Signing
Windows Update
Hardware Profiles
Hardware profiles provide a way for you to set up and store different hardware configurations.
Hardware Profiles
OK
Cancel
Apply

2. Click on '**Device Manager**' and expand the '**Ports (COM & LPT)**' list by clicking on the '**+**' sign next to it. You will find the '**Actisense NDC USB Serial Port**' in the list, followed by the allocated COM port number.



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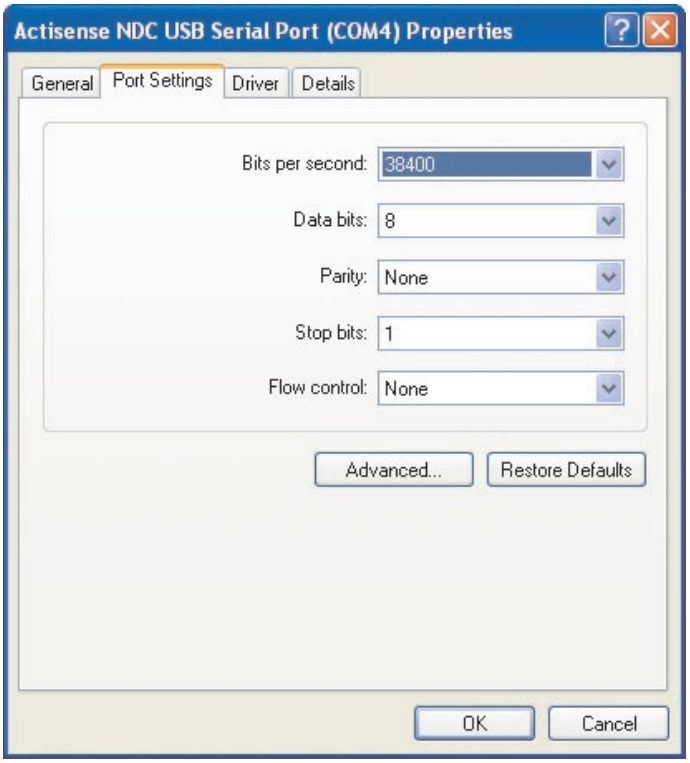
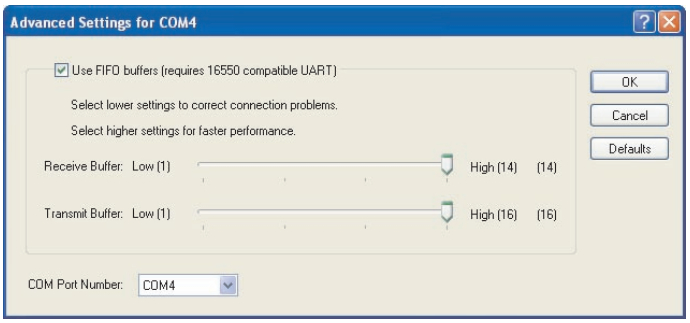
3. Double click on the port icon for the '**Actisense NDC USB Serial Port**' and the port properties window will appear. Click on the '**Port Settings**' tab. Select a Baud rate of 38400 for the '**Bits per second**' option. This is the fixed Baud rate for the **Actisense™** NDC-3 device. Leave the other settings as they are.



4. Click on the '**Advanced**' button and choose a different COM Port number if required (to make it compatible with the software requiring the NDC-3 NMEA data).

The other settings are already optimised for the **Actisense™** NDC-3 and should be left in the default values. Click on '**OK**' button to save the new settings.


Advanced Settings for COM4
Use FIFO buffers (requires 16550 compatible UART)
Select lower settings to correct connection problems.
Select higher settings for faster performance.
Receive Buffer: Low (1) High (14) (14)
Transmit Buffer: Low (1) High (16) (16)
OK
Cancel
Defaults
COM Port Number: COM4

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Specifications

Parameter	Conditions	Min.	Max.	Unit
Supply				
Supply voltage		8	35	V
Supply current (see note 1)	Supply voltage = 12v	27	34	mA
	Supply voltage = 24v	18	20	mA
NMEA				
Input voltage between +/-	Logical '1'/stop bit	-15.0	0.5	V
	Logical '0'/start bit	4.0	15.0	V
Input current	Maximum is under +35v overload condition	2.0	30	mA
Differential input voltage	Required level for NMEA to be detected	1.8	2.0	V
Output voltage between +/- and ground (see note 2)	Logical '1'/stop bit	0.0	0.5	V
		4.8	5.2	V
Output current (see note 2)	At maximum load, drive voltage reduces to 2v	-	32	mA
Output short circuit current.		50	55	mA
Baud rate - fixed (see note 3)			4.8	kbit/sec
Data propagation delay		1.0	100	ms
RS-232				
Input voltage range		-15	+15	V
Input voltage threshold	LOW	0.8	1.2	V
	HIGH	1.7	2.8	V
Output voltage swing	Loaded with 3κΩ to Ground	±5	±9	V
Output resistance	(RS232 Vout = ±2v)	300		Ohms
Output short circuit current (Infinite duration)			±18	mA
RS-232 & USB (virtual serial port via USB)				
Baud rate (see note 4)			38.4	kbit/sec
Data propagation delay		1.0	100	ms

General				
Ambient temperature		-20	+70	°C

Table 2 – NDC-3 specifications

All specifications are taken with reference to an ambient temperature (T_A) of +25°C.

Note:
1. Current consumption measured under no-load conditions
2. NMEA output is RS-485 compatible.
3. NMEA 0183 inputs and outputs on the NDC-3 are fixed to 4800 Baud
4. RS232 (and virtual serial port via USB) Baud rate is fixed at 38400 baud on the NDC-3

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